

tion to what should specially be observed during each of them. In spring to love-making, song, and nidification, in summer to incubation, nestlings, with their succession of plumages, and in autumn and winter to the congregating of birds in flocks, and to migration and the migratory instincts and such like. A further section is devoted to the added help to field observations to be obtained from the study of cage birds, and to the protection of birds by artificial nests, and in protected woods. The formation of collections, the methods of preserving eggs, skins, and skeletons, the description of the proper instruments for the purpose, and suggestions on the making of anatomical, systematic, faunistic, and specific observations occupy the penultimate sections. The final pages supply some hints on bird observation abroad.

The volume is illustrated by excellent blocks, many of them being reproductions of Kearton's well-executed photographs. There is also a good index.

ELECTRICAL ENGINEERING.

- (1) *Electric Circuit Problems in Mines and Factories.* By E. H. Crapper. Pp. viii+159. (London : Colliery Guardian Co., Ltd., 1910.) Price 3s. 6d. net.
- (2) *Exercises in Electrical Engineering for the Use of Second-year Students in Universities and Technical Colleges.* By Prof. T. Mather, F.R.S., and Prof. G. W. O. Howe. Pp. v+71. (London : E. Arnold, 1910.) Price 1s. 6d. net.

1) THE publication of this little volume is very opportune. Although the matter does not differ essentially from that found in other books on electrical testing of circuits, the manner of presenting the subject is admirable, and particularly well adapted to the class of reader for which the book is intended, namely, the colliery or factory engineer. There is no padding and unnecessary scientific verbiage, but directness of treatment, which must be welcome to the busy engineer. In this sense the treatment may be called popular; there is only little mathematics used, and that is of an elementary character, yet there is no sacrifice of scientific accuracy.

After a short chapter dealing with the units of measurements we get a chapter on the determination of insulation resistance, including tests on live systems. Here the author might with advantage have included Russel's and other tests on three-wire systems. The following chapter, called "Circuit Testing," is mainly concerned with the location of faults on cables by bridge and potentiometric methods, the latter being preferred by the author. Then we come to the construction of cables, and what the author has to say on this subject is well worth reading.

Finally, there are some chapters on polyphase apparatus and working. The only adverse criticism which the present reviewer has to make is as to the appearance of this little book. To present so much excellent matter in so poor a guise is not doing the author justice. The paper is too thin and the illustrations are not neat. They are also of varying style, sometimes to a large scale, sometimes with fine lines, then again to a small scale, or with unnecessarily thick

lines, making no distinction between lines that are intended to represent bodily objects, and others that are merely diagrammatic. These may seem unimportant matters to the reader who sits comfortably at his well-lighted writing-table, but let him take the book down a mine to consult it while he is making a test and he will begin to appreciate thick and non-transparent paper, large type, and a systematic method in illustrating electrical connections.

(2) In this little book the authors have collected the problems and exercises set in recent years at the Central Technical College, both as regards class work and examinations. All teachers know how important exercise classes are, especially if they are conducted in a similar manner to the everyday work of the practical engineer. Now in practical work problems seldom present themselves in the definite manner in which they must necessarily be given as examples in the lecture-room; the practical problem is often involved or obscured by side issues and part of the work of the practical man is to disentangle it and separate that which really is of importance from that which is merely a small disturbing influence, or without influence at all. To present to students exercises precisely in the same way as problems arise in practical work is, of course, impossible, for it would make the questions too long, but the authors have gone as far in this direction as may reasonably be expected. The questions are such that some preliminary consideration is required on the part of the student before he can translate the wording into mathematical form, and that is excellent training for his future work.

The 427 questions contained in the book are arranged in twenty-four chapters, ranging from the elementary conception of electric circuits to machinery and apparatus in practical use. Not all the questions are set in such way that a numerical answer can be given, many can only be answered in a general way, and these are specially useful, because of forcing the student to think instead of merely to calculate by some rule learned in the lectures or copied out of an engineering pocket-book. Where numerical answers are required the solution is given in an appendix, but the authors recommend that this appendix shall only be consulted after the solution has been found, not before. Some chapters would be the better for a more extended range of problems. Thus in the chapter on commutation we miss the subjects of influence of speed, brush contact resistance, and interpoles, while great stress is laid on shifting of brushes. But nowadays most machines do not require this shifting of brushes, sparkless commutation being obtained by interpoles, contact resistance, or some sort of compensating and commutating winding. Again, in the sections dealing with A.C. generators and transformers, nothing is found on the subject of heating or the predetermination of the inductive drop. The nomenclature is also peculiar. The authors distinguish alternators as of the "copper type," "iron type," and "inductor type." The last name is generally understood, but for the first two it would be better to retain the usual designation, namely, "without iron" and "with iron" in the armature. These are, however, quite minor blemishes; on the whole the

authors have given us an admirable collection of exercises, and if students will take the trouble to work through these 427 questions conscientiously they will find it excellent training for the solution of practical problems.

GISBERT KAPP.

ASPECTS OF DARWINISM.

- (1) *Darwinism and Human Life. The South African Lectures for 1909.* By Prof. J. Arthur Thomson. Pp. xii+245. (London: Andrew Melrose, 1909.) Price 5s. net.
- (2) *Darwinism and the Humanities.* By Prof. James Mark Baldwin. Pp. xi+125. Second edition. (London: Swan Sonnenschein and Co., 1910.) Price 3s.

(1) PROF. J. ARTHUR THOMSON is well known as one of the ablest and most judicious of recent critics of the Darwinian position. Fully appreciative of the extraordinary value of Darwin's contribution to evolutionary theory, he is yet ready to give an impartial hearing to all genuine investigators in the field of bionomics, whether their results appear to be favourable or adverse to the views advanced by Darwin. Like some other writers who strive to maintain a candid and unbiased attitude in the face of conflicting opinions, he is liable to the usual penalty of open-mindedness; the imputation, that is to say, of indecision—in homely phrase of “running with the hare and hunting with the hounds.” Such an imputation, if meant as a reproach, would be in Prof. Thomson's case undeserved; if intended as a tribute to his faculty for seeing both sides of a question, it would be justified.

The present volume, which is a reproduction in permanent form of a series of lectures delivered under the auspices of the South African Association for the Advancement of Science, is a good example of the author's skill in popular exposition. He does not shirk difficulties, but deals with them in a lucid and popular manner. In most respects he may be trusted as a faithful interpreter of the views both of Darwin and of his successors; here and there, however, in our opinion, he goes somewhat astray. A notable instance of this is his treatment of Darwin's term, the “Struggle for Life.” There can be no reasonable doubt that the leading idea in the mind of the originator of the phrase was competition—mainly between organisms of the same kind. Nothing is gained, and some confusion is introduced, by enlarging the conception so as to include resistance to adverse external conditions, or the strife between carnivorous animals and their prey. The evolutionary significance of these latter phases of organic existence lies in the fact that they necessitate competition, whether active or passive, and consequent selection, between generally similar individuals exposed to their influence. Here, in our opinion, Weismann, Haeckel, and Ray Lankester are right, and the author of “Darwinism and Human Life” is wrong.

On the question of the transmissibility of acquired characters or “somatic modifications,” Prof. Thomson takes the line (and indeed he could scarcely do

otherwise) that “we do not know of any clear case which would at present warrant the assertion that a somatic modification is ever transmitted from parent to offspring.” At the same time he fully recognises that these somatic modifications are very common, that they are of much individual importance, that they may have an indirect influence through the body on the offspring, and, in short, may exercise an indirect control over evolution in several ways. But he rightly denies that evidence exists of their influencing the germ-plasm in a specific or representative manner. That the germ-plasm can in certain cases be permanently altered by external conditions artificially induced was surmised many years ago by Weismann (for *Chrysophanus phlaeas*), and shown by Fischer (in *Chelonia caja*). The same fact has now been demonstrated on an elaborate scale by the careful experiments of Tower on *Leptinotarsa*. But it is hardly necessary to point out that these results go no way towards proving the “Lamarckian” contention.

Not the least interesting passages of Prof. Thomson's book are those in which he deals with the relation of Darwinism to social and political questions. But the bearing of the doctrine of natural selection on human affairs in the widest sense receives a still more thorough and extended treatment in Prof. Mark Baldwin's volume, entitled “Darwin and the Humanities,” of which a second edition has lately been published (2). The special value of Prof. Baldwin's contribution to Darwinian literature lies in the fact that he is not primarily a biologist with an interest in philosophy, but a philosopher who seeks in biological data the suggestion and justification of his philosophical method. Hence the importance of his conviction, reiterated in the course of the present and other treatises, that “natural selection is in principle the universal law of genetic organisation and progress in nature—human nature no less than physical nature.” This, he affirms,

“is the conclusion to which the lines of evidence we now have distinctly point; and while this has somewhat the appearance of a forecast, it is one of those reasonable forecasts which give life and interest to the progress of science and philosophy alike.”

The application of this view to the problems of psychology, the social sciences, ethics, logic, epistemology, philosophy, and religion, is the object of the present work, which, though it is in the author's words “no more than an outline or sketch,” yet succeeds in conveying in a comprehensive and effective manner the suggestion of a philosophic method in reasonable harmony with scientific facts and values.

A characteristic and consistent feature of Prof. Baldwin's conception of Darwinian theory is the emphasis that he lays on the psycho-physical character of the material presented to the operation of natural selection. Bound up with this is the recognition of mental plasticity, or, to use Sir E. Ray Lankester's term, “educability,” as an all-important factor in progressive development. One outcome of the view here spoken of is the rather unfortunately named principle of “organic selection”—a principle incidentally recognised, as the author shows, by